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The Hang High Pull: A Progressive Exercise Into Weightlifting Derivatives

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ABSTRACT

THE HANG HIGH PULL IS A WEIGHTLIFTING MOVEMENT DERIVATIVE THAT CAN BE USED IN THE TEACHING PROGRESSION OF THE CLEAN AND SNATCH EXERCISES. THIS EXERCISE ELICITS HIGH AMOUNTS OF LOWER-BODY POWER WITHIN THE SECOND PULL OF THE MOVEMENT BY EMPHASIZING THE EXTENSION OF THE HIP, KNEE, AND ANKLE JOINTS.

TYPE OF EXERCISE

The hang high pull is an explosive lower-body exercise that can be used to enhance lower-body muscular power (17). Furthermore, this exercise can be used as part of the teaching progression of the clean and snatch while emphasizing the second pull and triple extension of the hip, knee, and ankle joints. This exercise can be performed from a static position or with a countermovement (15).

MUSCLES INVOLVED

The muscles used during the hang high pull are similar to those described in previous articles regarding related weightlifting derivatives (3–5,14).

BENEFITS OF THE EXERCISE

The hang high pull is an exercise that may enhance lower-body muscular power (16,17), while serving as a teaching tool to improve the technical aspects of the second pull phase during weightlifting variations. Previous research suggests that the hang high pull may actually produce greater force (17), velocity (17), and power (16,17) as compared with the hang power clean at the same absolute loads. Although this may be due to technical errors made by the athletes when performing the clean, the findings do suggest that as an athlete develops form in the complete movements, he or she can gain similar advantages through the hang high pull. Thus, this exercise should be considered as a primary exercise to train lower-body power but should also complement other exercises that are currently being used in the strength and conditioning program. Because of its ability to produce high levels of force, velocity, and power, this exercise may be implemented in various stages throughout the training year.

Another aspect of the hang high pull that may result in a greater overload is that the completion of the exercise does not require the athlete to "catch" the weight either across their shoulders as is customary of the clean, or overhead, which is characteristic of the snatch. Although research is limited on the kinematics of the hang high pull, the removal of the catch portion may allow athletes of lower proficiency to accelerate through the entire triple extension. As Newton et al.

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(13) remind us, a movement that is more ballistic in nature may produce greater force output, power, velocity, and muscle activation as compared with a variation that requires a negative acceleration to complete the exercise. As such, the hang high pull may allow the athlete to overload the explosive triple extension of the hip, knee, and ankle joints with a greater force, velocity, and power stimulus (16,17).

STARTING POSITION

- Before achieving the starting position, the athlete should place their hands on the bar using an overhand grip at a distance that is preferred for either the clean or snatch (5,6). In addition, the athlete should consider using the hook grip or lifting straps to prevent losing control of the bar when heavier loads are used (6).
- After the athlete has properly placed their hands on the bar, the athlete should remove the bar from the rack or boxes and stand with their feet in a position that is similar to what is used during partial pulling movements and/or jumping movements. The athlete's feet should be approximately hip width apart with their toes slightly turned out if preferred.
- The athlete should be positioned in the power position (1,8,12). Specifically, the athlete's knees should be slightly bent while maintaining isometric contractions with posterior musculature to retain an erect and upright posture. The athlete should be cued to pull the shoulders back (tight back) and to maintain a "big chest."
- During the clean variation of the hang high pull, the bar should be in the power position (1,8,12) that is located below the hip fold on the upper part of the thighs (i.e., midthigh; Figure 1). The hips, knees, and ankles should be within the ranges of 140–150°, 120–130°, and 60–70°, respectively (4). When changing grips between clean and snatch, it should be noted that small differences will exist in the starting position of the bar. The starting position bar height relative to the snatch variation of the hang high pull should be positioned within the inguinal groove of the hip due to the wider hand spacing (5,6).
- At this point, regardless of if the athlete is performing a countermovement or not, the athlete should be cued to rotate their elbows out and flex their wrists to keep the bar close to their body during the lift.
- Finally, it should be verbalized to the athlete that they should drive through their heels before the explosive second pull phase of the exercise to ensure proper muscle activation.

Figure 1. Starting position for the hang high pull.

DESCENDING PHASE OF THE COUNTERMOVEMENT

- While descending during the countermovement, the athlete should maintain a rigid torso by cuing a "big, inflated chest" and tight back by isometrically contracting posterior musculature. In addition, the athlete should continue to drive through their heels (3).
- The athlete should fold forward at the hip while keeping their knees in a slightly bent position and pushing their hips backward.
- The athlete should keep their eyes up and continue to look forward while they maintain proper posture and keep the bar close to them by lowering it down their thighs.
- The athlete should be instructed to "lean over the bar" to maintain a shoulder position over/ahead of the bar.
- The bar should be lowered to a position just above knee level (11) before starting the ascending and second pull phases (Figure 2).
- To achieve the greatest stretch-shortening cycle benefits during the countermovement variation, this phase of the hang high pull should not be performed slowly. However, the descending phase of the countermovement should be performed in a controlled manner while maintaining proper posture throughout the movement.

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Figure 2. Barbell position above the knee between the countermovement and barbell elevation phases of the hang high pull.

- For the static-start variation, the bar should be held in the lowest position for 2–3 seconds to allow the effects of the stretch-shortening cycle to dissipate.

ASCENDING PHASE OF THE COUNTERMOVEMENT

- From the lowered countermovement position, the athlete should begin to return to the midthigh (power) position by driving through their heels, keeping the bar close to their body, and maintaining proper posture.
- The athlete's knees should rebend and their torso should return to an upright position.
- The hips of the athlete should begin to move back to their original position as the athlete guides the bar back up their thighs to the power position.
- The ascending phase ends when the athlete returns from the lowered countermovement position back to the original starting position previously mentioned.
- This phase of the hang high pull is a transition into the power position and should be performed in a controlled manner. The intensity of the movement will build up to the midthigh (power) position before the barbell elevation phase.

BARBELL ELEVATION PHASE

- The final phase of the hang high pull begins when the athlete returns to the midthigh (power) position from the countermovement. As such, the athlete should use the momentum created by the countermovement to build up the intensity into an explosive triple extension movement.
- The athlete should aggressively extend their hips, knees, and ankles to perform an explosive triple extension movement while simultaneously shrugging their shoulders.
- At this point, the athlete should use the explosive triple extension movement to begin elevating the barbell to approximately chest height. As the barbell begins moving vertically, as a result of the second pull, the athlete should break the elbows to complement the increase of bar speed generated by the triple extension of the second pull to further elevate the barbell to chest height (7,10,17).
- While elevating the bar to their chest height, the athlete should be cued to "lead with their elbows up to the sky" and keep the bar close to their body (Figure 3).
- Finally, the athlete should lower the bar in a controlled manner and end in an athletic position, absorbing the majority of the downward momentum with the legs.

COMMON MISTAKES OF THE HANG HIGH PULL

- The athlete may begin the second pull movement too early when transitioning to the power position. This will prevent the proper vertical force generation during the triple extension movement.
- The athlete may push their hips too far forward instead of driving vertically through the heels. This will likely cause a looping of the barbell away from the athlete's body.
- The athlete may not finish the full triple extension of the hip, knee, and ankle joints, ultimately preventing the ability to produce maximum force.
- The athlete may not aggressively shrug at the top of the second pull or triple extension movement.
- The athlete may "dip" before initiating the triple extension movement.
- The athlete may "dip" during barbell elevation to the chest. This will likely result in the athlete not completing the triple extension movement.
- The athlete may not elevate the barbell to chest height at the completion of the second pull.

DISCUSSION

The hang high pull is a clean and snatch variation that is typically used in the teaching progression for each exercise. Suchomel et al. (17) indicated that the hang high pull can produce high amounts of force, velocity, and

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Figure 3. Finish of the barbell elevation phase and triple extension for the hang high pull.

power. As a result, the hang high pull may be implemented as a primary exercise to enhance lower-body muscular power, while emphasizing the second pull phase of traditional weightlifting movements. By using the countermovement option with the hang high pull, athletes can simulate the sensation created by the transition from the first pull from the floor before the second pull phase of traditional weightlifting movements. Furthermore, by implementing the hang high pull into an athlete's strength and conditioning regimen, a practitioner will be providing a less technical exercise that will allow their athletes to effectively train lower-body muscular power.

PRACTICAL APPLICATIONS

As with other weightlifting movement derivatives, the hang high pull can be implemented in most training blocks. It should be noted that the goal of the training block will determine the training load and volume of sets and repetitions that should be prescribed (13). The loading recommendations for the hang high pull within the current literature are somewhat limited. However, the existing studies provide some basic guidelines for loads that may optimize peak force, velocity, and power (16–18).

The hang high pull can be implemented during a strength-endurance block that uses light to moderate loads (0–65% of hang power clean or hang high pull 1RM) while prescribing a higher repetition range (e.g., 3 sets of 10 repetitions) (4,14). Performing repetitions of the hang high pull at 0% 1RM can be accomplished by using a PVC pipe. The emphasis during this training phase should be on the athlete's technique so that he/she can progress to heavier loads during future training blocks while limiting the accumulation of fatigue that would result from higher volume loads as a result of intensities above and beyond 65% hang power clean. A higher repetition scheme may also allow the athlete to develop their power-endurance abilities. The strength and conditioning practitioner should consider the athlete's ability to perform the exercise with proper technique during a high volume phase because proper exercise technique may be affected by fatigue. It is therefore recommended that when using the hang high pull within a strength-endurance phase, cluster sets (e.g., sets of 2 or sets of 5) should be implemented to prevent and/or manage the accumulation of fatigue that may lead to breakdowns in technique. This type of set configuration may also allow for the maintenance of power development throughout a training set as compared with set configuration that does not use clusters (9). Furthermore, cluster sets will allow practitioners to provide ample feedback to the athletes to solidify their technique.

The hang high pull may also be prescribed during maximal strength and strength-power training blocks. During these phases, the practitioner should reduce the volume of hang high pull repetitions (e.g., sets of 5 − sets of 3), while increasing the load. The current hang high pull research has only examined external loads as high as 80% of maximal hang power clean (16,17) or 70% of maximal hang high pull (18). However, it is likely that the maximum load that can be prescribed without decrements to technique is the load that corresponds to the athlete's 1RM hang power clean. Comfort et al. (2) demonstrated that loads in excess of 100% 1RM (120–140%) of an athlete's power clean can increase an athlete's rate of force development during another weightlifting derivative (mid-thigh pull). By implementing the hang high pull at this point during the training year, practitioners can provide the athlete with the opportunity to further stabilize their technique leading into future training blocks where the complete weightlifting movements (clean

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or snatch) may be prescribed. Furthermore, by using the hang high pull in a maximal strength or strength-power training block, the athlete may have the opportunity to accelerate heavy loads through the entire triple extension movement without having to drop under the bar to catch the weight.

Finally, the hang high pull may be implemented in an explosive speed or maintenance block in which the main goal is to improve peak power production of the athlete. For this training block, practitioners should reduce volumes and loads (e.g., sets of 3 and sets of 2). Previous research (16,17) has indicated that loads ranging 30–45% of the athlete's 1RM hang power clean should be used to train peak power during the hang high pull. Another study by Thomas et al. (18) indicated that the greatest amount of peak power during the hang high pull occurs in the range of 30–60% of the subject's 1RM hang high pull. The practitioner should base the load selection on the athlete's technical proficiency and strength. For example, weaker or less technically proficient athletes should have loads prescribed on the lower end of the recommended peak power range (i.e., 30% maximum hang power clean or hang high pull). In contrast, stronger, more technically proficient athletes should be prescribed loads on the upper end of the peak power range (i.e., 45% maximum hang power clean or 60% maximum hang high pull). It should be noted that limited literature currently exists on the optimal load for peak power development during the hang high pull, and thus, it is currently difficult to provide loading recommendations. Therefore, it is suggested that future research should investigate how various loads affect the performance of the hang high pull to provide practitioners with information on proper loading assignments.

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REFERENCES

1. Beckham GK, Mizuguchi S, Carter C, Sato K, Ramsey M, Lamont H, Hornsby G, Haff G, and Stone M. Relationships of isometric mid-thigh pull variables to weightlifting performance. *J Sports Med Phys Fitness* 53: 573–581, 2013.
2. Comfort P, Udall R, and Jones PA. The effect of loading on kinematic and kinetic variables during the midthigh clean pull. *J Strength Cond Res* 26: 1208–1214, 2012.
3. DeWeese BH and Scruggs SK. The countermovement shrug. *Strength Cond J* 34: 20–23, 2012.
4. DeWeese BH, Serrano AJ, Scruggs SK, and Burton JD. The midthigh pull: Proper application and progressions of a weightlifting movement derivative. *Strength Cond J* 35: 54–58, 2013.
5. DeWeese BH, Serrano AJ, Scruggs SK, and Sams ML. The clean pull and snatch pull: Proper technique for weightlifting movement derivatives. *Strength Cond J* 34: 82–86, 2012.
6. Favre M and Peterson MD. Teaching the first pull. *Strength Cond J* 34: 77–81, 2012.
7. Garhammer J. Power clean: Kinesiological evaluation. *Strength Cond J* 6: 61–63, 1984.
8. Haff GG, Stone M, O'Bryant HS, Harman E, Dinan C, Johnson R, and Han K-H. Force-time dependent characteristics of dynamic and isometric muscle actions. *J Strength Cond Res* 11: 269–272, 1997.
9. Haff GG, Whitley A, McCoy LB, O'Bryant HS, Kilgore JL, Haff EE, Pierce K, and Stone MH. Effects of different set configurations on barbell velocity and displacement during a clean pull. *J Strength Cond Res* 17: 95–103, 2003.
10. Hydock D. The weightlifting pull in power development. *Strength Cond J* 23: 32, 2001.
11. Kawamori N, Crum AJ, Blumert PA, Kulik JR, Childers JT, Wood JA, Stone MH, and Haff GG. Influence of different relative intensities on power output during the hang power clean: Identification of the optimal load. *J Strength Cond Res* 19: 698–708, 2005.
12. Kraska JM, Ramsey MW, Haff GG, Fethke N, Sands WA, Stone ME, and Stone MH. Relationship between strength characteristics and unweighted and weighted vertical jump height. *Int J Sports Physiol Perform* 4: 461–473, 2009.
13. Stone MH, Pierce KC, Sands WA, and Stone ME. Weightlifting: Program design. *Strength Cond J* 28: 10–17, 2006.
14. Suchomel TJ, DeWeese BH, Beckham GK, Serrano AJ, and Sole CJ. The jump shrug: A progressive exercise into weightlifting derivatives. *Strength Cond J* 36: 43–47, 2014.
15. Suchomel TJ and Sato K. Baseball resistance training: Should power clean variations be incorporated? *J Athl Enhancement* 2: doi: 10.4172/2324-9080.1000112, 2013.
16. Suchomel TJ and Wright GA. Power development comparisons between power clean variations at different relative loads [abstract]. *J Strength Cond Res* 27: S76–S77, 2013.
17. Suchomel TJ, Wright GA, Kernozek TW, and Kline DE. Kinetic comparison of the power development between power clean variations. *J Strength Cond Res* 28: 350–360, 2014.
18. Thomas GA, Kraemer WJ, Spiering BA, Volek JS, Anderson JM, and Maresh CM. Maximal power at different percentages of one repetition maximum: Influence of resistance and gender. *J Strength Cond Res* 21: 336–342, 2007.

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